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ABSTRACT

Theoretical considerations for peer and cross-age tutoring are presented, essential ingredients for effective programs are offered, and a practical approach used by consulting teachers to design and implement a cost-effective tutoring program in Barre, Vermont is described. Benefits for the tutor and tutee are pointed out, including that tutoring can enhance a student's self esteem. Noted among ingredients for effective tutoring are training for tutors in methodology as well as content, including pre-established instructional objectives and corresponding mastery tests in the tutoring program, and giving tutors incentive by increasing the visibility of their "teacher" role. The effectiveness of the Barre City Schools tutoring program is considered in terms of elementary pupil math score growth and demonstrated human competencies in the high school tutors. Brief sections describe the program, program goals, and program and finance data. Appended materials, which make up the bulk of the document, include sample forms, statistical data on the program effectiveness study, and a sample peer/cross-age tutor training packet. (SBH)

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THE COST EFFECTIVENESS OF PEER AND CROSS-AGE TUTORING

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THE COST EFFECTIVENESS OF
PEER AND CROSS-AGE TUTORING

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THE COST EFFECTIVENESS OF PEER AND CROSS-AGE TUTORING

INTRODUCTION

The use of children as teachers in school is the central theme of this paper. Peer and cross-age tutoring is by no means a recent innovation, but it has been the object of particular interest and study by social scientists and educators within the past several years. A volume edited by Vernon L. Allen - Children as Teachers: Theory and Research on Tutoring - includes studies about the theory, research and application of peer and cross-age tutoring. This paper addresses another important aspect of the concept of children working as teachers: cost-effectiveness.

Some theoretical considerations of tutoring gleaned, in part, from the Allen book are presented in the first section of this paper. In order to be cost-effective, a program must first be effective. Students must master the skills they are taught during tutoring. Essential ingredients for effective programs are therefore presented next. The last section describes the pratical, step-by-step approach used by consulting teachers to design and implement a cost-effective tutoring program in Barre, Vermont.

THEORETICAL FRAMEWORK

In an article called "The Uses of Immaturity" (1972), Jerome Bruner proposes giving children in school more responsibility for educating each other. He says education should be a "communal" rather than a competitive undertaking. He recommends "student-assisted learning" (Bruner, 1972, p. 63).

The report of the Panel of Youth of the President's Science Advisory Committee (Coleman, 1974) establishes two essential requisites for an environment to be appropriate for young people:

1) Children must have the opportunity to acquire the basic academic and social skills. This is a self-centered objective, the traditional goal of schools.

2) Children should have the opportunity for responsibilities that affect the lives of others. This objective, traditionally, has not been included in the school curriculum.

These recommendations articulated by Bruner and the Panel of Youth that children be given the responsibility for helping others provide a solid framework on which to expand the concept of peer and cross-age tutoring.

THE HELPING RELATIONSHIP

Benefits for the tutor

A clue to the tutor-tutee role relationship is found in the word "tutor" itself, which is derived from the Latin "tueri", a verb meaning "to protect, to guard, to care for". In our society, children have typically been the recipients of help, care and protection, rather than the givers. It is clear that the process of helping another person can result in beneficial psychological changes in the person providing the help. In a program such as tutoring, children have a chance to feel useful and needed themselves. Research has shown that young people engaged in volunteer service, such as the Peace Corps, derive personal benefits from the experience (Gillette, 1968).

It is evident that tutors may understand another person's point of view by placing themselves in the "shoes" of their tutees. A study by Schatz and Gelman (1973) found that older children used simpler and shorter utterances when speaking with younger listeners and made special efforts to keep their interest and attention.

Being a tutor can enhance a student's self-esteem. It is clear that many attractive elements constitute the role of teacher. A teacher is accorded respect and status by students. When a student is placed in the role of tutor (teacher), the student must live up to the expectations associated with that role. This role-playing then results in reward and attention from the supervising adults and status in the eyes of other students.

An ancient dictum "Qui docet discit" reminds us that (s)he who teaches, learns. Critics of peer tutoring might argue that the tutor is doing work which is the responsibility of the teacher and that only the tutee benefits from tutoring. Research has shown, however, that benefits accrue for the tutor as well. Being the role model for a younger child can, for example, foster more mature social behavior on the part of the tutor.

In one study (Conlon, Hall, Hanley, 1972) the tutor's own math performance improved as much or more so than the tutee's. In another study (Dineen, Clark, Risley, 1977), similar results were obtained when children were involved in a peer tutoring program for spelling. The tutors' own spelling improved when they were charged with the responsibility of teaching spelling to other children.

A number of studies have found that low achievers in reading made significant gains in their own reading ability following their tutoring of younger children. For instance,

Klentschy (1971) found that sixth grade low achievers showed significant gains in reading after just two months of tutoring low-achieving second graders in reading.

This is an important aspect of tutoring for teachers to consider when choosing tutors. If it is possible, as the data show, for the tutor's own performance to improve as a result of tutoring, does it make sense for teachers to select only their best students as the tutors? In a study in the Allen book, Robert Cloward maintains "There is virtually no correlation between the tutor's intellectual credentials and his effectiveness in tutoring." (Cloward, In Allen (Ed.), 1976, p. 228) He goes on to suggest teachers should not impose high academic criteria in the selection of tutors but should give attention instead to selecting tutors who will benefit themselves from the tutoring experience.

Benefits for the tutee

The advantages of tutoring for the tutee are much more obvious. First of all, tutoring is a method for individualizing instruction. By virtue of the one-to-one or small group situation, the material to be learned can be matched closely to the learner's ability. Secondly, immediate feedback can be provided in a more intimate setting. There are more opportunities for affective expressions given out as reinforcers on an individual basis than with a large class. The Allen book cites extensive studies where the academic performance of the tutee improved as a result of peer or cross-age tutoring.

Research shows that older age is positively valued by younger children (Lohman, 1970); hence, being associated with an older student can enhance a younger child's self-esteem.

Inherent in the child-teaching-child situation there is an important element which is often lacking when an adult is the teacher. A friend two to four years older can have a working relationship which is less distant than that of an adult. It is possible that an affective relationship will develop, and this emotional component may be an important factor contributing to the tutee's progress.

In research by Allen and Feldman (1975), videotape records were made of a child listening to a difficult and easy lesson. The films were then shown to other children and adults who were asked to estimate how much each child understood the lesson. Results showed that third and sixth graders were more accurate than adults in discriminating between instances of understanding and nonunderstanding on the basis of very minimal nonverbal cues. This suggests that children are superior to adults regarding sensitivity to subtle cues when judgments must be made about other children.

Before leaving this section, we should point out that negative consequences can also result from the tutor-tutee interaction. The opportunities for mischief are great in cross-age tutoring - good results don't just happen. The "helping" relationship doesn't develop automatically. Teachers who send tutors into a classroom to "help out" will be disappointed. The next section contains tips for effective peer tutoring programs.

INGREDIENTS FOR EFFECTIVE TUTORING

Now that we have developed a rationale for peer and cross-age tutoring, we are ready to make it work. It is frequently assumed that bringing two students together and calling one the tutor will automatically produce results. In a study in the Allen book, however, Grant von Harrison says "... a low achiever will progress only when he has access to an individual tutor whose role is highly structured, and who knows how to apply principles of learning and how to use appropriate instructional materials." (Harrison. In Allen (Ed.), 1976, p. 170)

Harrison's math study (1969) illustrates the importance of the tutor's pedagogical skills. In this study, trained and untrained tutors were randomly assigned to teach math to first graders. Both groups used the same instructional materials and spent the same amount of time teaching. Observations of the sessions showed that trained tutors followed closely the specified tutoring procedures, but the untrained tutors' behavior consistently interfered with learning. Among other things, they punished, overcued extensively, didn't give verbal praise and provided feedback before the child made the appropriate response.

Training programs for tutors must teach them learning principles as a systematic way to teach and assess. Tutors who have been trained in methodology and well as content are better performers than those who enter the tutoring situation unprepared.

Tutors are more likely to help their tutees attain the specified objectives of the lesson if they can:

1) Establish rapport with the tutee
2) Secure the tutee's attention
3) Give clear instructions, letting the tutee know precisely how (s)he is to respond
4) Give a clean presentation of the new information
5) Praise the tutee for a correct response
6) Correct the tutee by:
   - Modelling the correct answer
   - Saying the answer with the tutee
   - Requiring the tutee to say the answer alone

7) Avoid punishing

8) Avoid using subtle cues to prompt the tutee

9) Stay on task and pace the lesson at a reasonable speed

10) Use specific criteria to judge when an objective has been mastered

11) Use a consistent system of reinforcement

12) Keep accurate records.

It is crucial that tutor training last as long as it takes to validate acquisition of these essential skills. An efficient procedure for the training consists of role-playing sessions where a) the trainer models the procedure while the tutor plays the part of the learner, and b) the trainer plays the part of the learner while the tutor practices the tutoring skills. Reasons for using certain methods should be explained to the tutor.

Results of tutoring programs will be disappointing unless the program itself is designed properly. A program must be structured to include the following ingredients:

1) Pre-established instructional objectives and corresponding mastery tests

2) Pre-test - leading to instructional prescriptions

3) Specified sequence of objectives and management procedure to assure sequence is followed

4) Instructional materials designed to teach the objectives and provide sufficient repetition for low performers

5) Criterion tests to check mastery regularly

6) Built-in procedure for modifying instruction when learner doesn't master the instructional prescription.

Even after the program has all the essential structuring elements and after the tutors are trained, the teacher cannot afford to sit back and wait for the results. The system will not be effective unless the teachers monitor the tutors by observing often, retraining and remotivating tutors when necessary. It is important to use a checklist when observing tutors, to go over the records the tutors are required to keep and to praise the tutors for their work. When monitoring tutors, the supervising teacher should check the tutors on tutoring skills 1-12 above. In addition, tutors should be checked on dependability - was the tutor prompt and prepared? - and on attitude - was the tutor positive, persistent, friendly and supportive?

A good way to give the tutors incentive is to increase the visibility of their "teacher" role. Give them a portfolio to carry with daily log and lesson plans; checklists for discipline and skill acquisition. Students enjoy having record-keeping

paraphernalia. They may also be rewarded with a certificate as a certified student teacher at the end of the year.

Now that we have a recipe for effective programs, we are ready to address the issue of cost-effectiveness. The last section describes a cost-effective program based on principles of tutor training, program structuring and monitoring.

AN ANALYSIS OF THE EFFECTIVENESS OF HIGH SCHOOL TUTORS IN THE DELIVERY OF SPECIAL EDUCATIONAL MATH SERVICES TO ELEMENTARY SCHOOL PUPILS

The Consulting Teacher in the Barre City Schools is a member of an interdisciplinary team whose function is to insure the provision of special educational services to eligible children within the district. One function of the Consulting Teacher is to monitor the delivery of math services to eligible children. This is done primarily through inservice training to teachers in the six elementary schools, and through the tutoring services of the four math paraprofessionals employed by the district. Since the 1977-78 school year, an additional method has been used in one of the elemetnary schools. Students at Spaulding High School have provided tutoring services to elementary students at Ayers Street School.

This paper attempts to evaluate the effectiveness of this new program on the basis of elementary pupil math score growth and demonstrated human service competencies in the high school tutors. Levin (1977) states that the "purpose of evaluation research is to obtain information that might be used to chose among alternative policies or programs for achieving social objectives ... associated with any alternative is not only impact or effect but also a sacrifice or cost." (Levin, 1977, p. 89) These costs, as well as program effects, must be considered and "comparison of total program costs is most appropriate when we are confronted with alternatives of about equal effectiveness." (Levin, 1977, p. 108) We compared effectiveness of the Ayers Street program, utilizing high school students as tutors, with that of the alternative program of paraprofessional math tutors hired to work in the other elementary schools within the district. After the academic impact of each was determined, we analyzed each program's costs. An attempt was made to consider both direct expenditures or "accounting costs" as well as indirect and "opportunity costs."

Academic impact was determined by success in reaching specific objectives which were determined before program implemention. It is becoming an increasingly undisputed fact in the field of education that those seeking to assess program success must first establish clear, measurable objectives at the beginning of the program. (Gardner, et al, 1971; Batemen 1971, 1977). DeLindsheere (1977) states "There can be no correct evaluation without clear objectives." (DeLandsheere, Vol. 1, No. 2. 1977) Public sector economics and finance also realizes the importance of objectives. This is evident in the first step of P.P.B., which calls for a careful specification and analysis of objectives (Shultze, Rowen, 1969). Haldi (1969), in listing the steps involved in a good systematic analysis, begins with "defining program objectives." (Haldi, 1969, p. 151)

Direct cost considerations were paraprofessional salary and FICA and costs of teachers and Consulting Teacher in high school tutor supervision.

Because each tutoring alternative requires similar monetary expenditures such as Consulting Teacher office space and overhead, supplies, teaching materials, etc., these costs were not considered in this analysis.

Indirect cost considerations included person-hour costs to high school tutors, and "opportunity costs" to Consulting Teachers and classroom teachers.

I. Program Description

An explanation of the program was presented to high school students in the spring. Interested tutors were chosen on the basis of expressed interest in human services and performance enabling them to have regular time away from their course schedules. A high school guidance counselor and a consulting teacher coordinated the tutor selection. In the fall, tutors signed a contract to provide continuous school year service. These tutors were given a competency based introductory course in "How to be an Effective Teacher" which was taught by the consulting teachers. This included demonstrations and explanations of direct instruction techniques, including clear instructional presentation, modeling, prompting and effective correction procedures (Appendix I - Tutor Training Packet). As their practica assignment, they were expected to tutor an elementary student on a regular basis for the entire school year.

Prescriptions, including entry level and objectives, were written for each tutor by the elementary principal, consulting teachers and classroom teachers. The high school tutors were encouraged to find new ways to help their tutee learn as well as to provide reinforcement programs to increase learning rate. Progress was charted on the basis of the Barre City Math Minimum Objective System (Appendix 2).

Each Ayers Street elementary teacher monitored the progress of the tutored students from her class. Suggestions for program changes and additions were based on the rate of skill acquisition.

Data was kept by tutors daily and compiled monthly for the teachers, consulting teachers and principal (Fig. 1 & 2).

Nine high school tutors participated in the Ayers Street Project and nine elementary students in grades 1-4 received tutoring services. In the other elementary schools, a total of 40 students in grades 1-4 were tutored by the four math paraprofessionals. In addition, these four paraprofessionals also tutored a total of 24 5th and 6th grade students.

The four paraprofessionals were trained with similar materials as the high school students. However, most of the paraprofessionals had two to three years of previous experience, and a large portion of their training was done by the most experienced paraprofessionals in a more intensified manner during the first two days of school in the fall.

II. Program Goals

The purpose of the Ayers Street tutoring program was to assure that educationally deficit children were remediated with quality services, while at the same time offering

enrichment and challenge to high school tutors. Therefore, program success was measured by the following objective for the elementary students (in all schools):

> Given referred elementary students eligible for special educational math services, the tutors will provide services so that 90% of the elementary students referred will achieve at an accelerated rate that is more than one month growth per month of instruction as measured by the Barre City Math Minimum Objective Probes.

In addition, the following objectives were written for the high school students:

> 90% of high school students selected for the Ayers Street project will:
>
> - demonstrate competencies in direct instruction and learning theory techniques as measured by their tutee's accelerated rate of learning and by participation in workshop discussions,
> - demonstrate competencies in data taking as evidenced by complete and accurate daily and monthly data sheets,
> - express satisfaction with service to others as measured by positive responses on tutor attitude scale and verbal and written evaluation comments,
> - accept responsibility for helping children as measured by
>
> signing contract
> regular (100%) attendance at tutoring sessions (except for previously excused absences).

III. Program Data

Math pre-post test scores for elementary students (Fig. 3) reveal that both programs were effective in meeting the objective of accelerated rate of acquisition of math skills. Test scores cover the 8-month period that the Ayers Street Program had been in effect. The average test score growth in each program was 1.5 months growth per 1 month of instruction.

In addition, each of the nine high school tutors met all four objectives which had been written for them (Fig. 4). Outstanding competencies were demonstrated in direct instruction, learning theory and data taking. All tutors followed through on their commitment and all expressed

satisfaction with their participation in the program. A tutor attitude scale administered to all high school tutors (Fig. 5) resulted in positive answers (#1 & 2) for all statements by all tutors. All high school tutors indicated that they would "do it again" if given a chance and all said they would recommend it to others.

IV. Finance Data

Fig. 6 reveals that the direct per pupil costs for each program are also about equal for the 1977-78 school year ($254 in regular program and $230 in Ayers Street program). However, during the current school year (1978-79), the cost of the Ayers Street program dropped to $71 per child, while the cost of using paraprofessionals remained at $254. Data indicate that the cost of the Ayers Street program will continue to decline. We are planning to increase the number of children served while decreasing the number of person-days spent in monitoring.

This data was compiled by figuring and comparing the amount of time spent by consulting teachers and teachers in training and monitoring both groups. This was converted to a dollar amount based on average salary and other costs of participating teachers (Fig. 7) and consulting teachers (Fig. 8) divided by the 180 school year days. Paraprofessional tutor salaries and other costs (Fig. 9) were considered for the regular program. An average cost per child for math tutoring programs was derived by dividing the total cost of each program by the number of elementary students served within each program.

Discussion

The data in this analysis reveals that both tutoring alternatives are about equal in terms of effectiveness for elementary learners, while direct costs are less in the Ayers Street program. In addition, the Ayers Street Program resulted in benefits for the high school tutors. Some of these benefits were easy to measure (the objectives) and some were more subjective. Several written comments by tutors were: "It's a great experience", "I learned a lot from it" and "Our hats are off to all of you - Thank you".

In order to provide "appropriate public education" to all special education eligible students, our need for tutor services will increase. School budget problems lead one to believe that there will not be a proportionate increase in money available to hire these services. The high school tutoring program offers a viable alternative. In this way we have shown that we can offer quality services to deficit elementary learners, while providing worthwhile learning for high school students.

This service will be continued next year with some changes. It will be offered as a course that high school students may take on their course schedules, thus enabling us to have a firm,

regular time to train and monitor the high school students. We have now included high school juniors in the program so that we may use their service for two years. We also hope to use our paraprofessional math tutors to do much of the training of high school tutors, thus making the program even more cost effective.

It was suggested that the tutor "person-hours" per elementary pupil be figured also. This will be done with both high school tutors and their tutees and with paraprofessional tutors and their tutees. This may lead to some interesting further considerations in the areas of effective tutor-pupil ratio and number of sessions needed per week for good math score growth.

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Fig. 1

DAILY TAB SHEET

Tutor _____

Student _____ Grade _____

Teacher _____ School _____

Date	Length of Session	Number of Children in Group	Objective(s) Worked On	Teaching/ Learning Procedure	Comments

Fig. 2

MONTHLY REPORT FORM

Tutor: _____ Month _____ 19___

School: _____

Students	AGL	FGL Sept.	FGL for ___	Number of Sessions	Number of Objectives Mastered This Month	Comments

Fig. 3

MATH PRE-POST TEST SCORES FOR
ELEMENTARY STUDENTS TUTORED BY
HIGH SCHOOL CROSS-AGE TUTORS

	Pre Test Grade Level Oct. '77	Post Test Grade Level May '78	No. Months Gain	Average Gain Per Grade Level
Grade 1				
P-1	K.7	1.9	12 mos.	13 mos. growth/ 8 mos. instruction =
P-2	K.6	2.0	14 mos.	1.6 mos. growth/ 1 mo. instruction
Grade 2				
P-3	1.3	2.8	15 mos.	14 mos. growth/ 8 mos. instruction =
P-4	1.4	2.7	13 mos.	1.8 mos. growth/ 1 mo. instruction
Grade 3				
P-5	2.0	3.3	13 mos.	14 mos. growth/ 8 mos. instruction =
P-6	1.8	3.3	15 mos.	1.8 mos. growth/ 1 mo. instruction
Grade 4				
P-7	3.1	3.6	5 mos.	13 mos. growth/ 8 mos. instruction =
P-8	2.6	4.7	21 mos.	1.6 mos. growth/ 1 mo. instruction
P-9	3.1	4.5	14 mos.	

Fig. 3 (cont.)

MATH PRE-POST TEST SCORES FOR ELEMENTARY STUDENTS TUTORED BY PARAPROFESSIONALS

The following pupils were selected from the group of those tutored by paraprofessionals on the basis of demographic similarity, grade placement and pre test scores.

	Pre Test Grade Level Oct. '77	Post Test Grade Level May '78	No. Months Gain	Average Gain Per Grade Level
Grade 1				
P-12	K.6	1.8	12 mos.	11 mos. growth/ 8 mos. instruction =
P-16	K.7	1.7	10 mos.	1.4 mos. growth/ 1 mo. instruction
Grade 2				
P-20	1.3	2.6	13 mos.	14 mos. growth/ 8 mos. instruction =
P-22	1.4	2.9	15 mos.	1.8 mos. growth/ 1 mo. instruction
Grade 3				
P-26	2.[illegible]	[illegible].7	17 mos.	15 mos. growth/ 8 mos. instruction =
P-37	1.9	3.2	13 mos.	1.9 mos. growth/ 1 mo. instruction
Grade 4				
P-41	3.1	4.8	17 mos.	14 mos. growth/ 8 mos. instruction =
P-46	3.1	4.6	15 mos.	
P-47	2.7	3.8	11 mos.	1.8 mos. growth/ 1 mo. instruction

Average Gain for Cross-Age Tutor Program: 1.7 mos. growth/ 1 mo. instruction

Average Gain for Paraprofessional Tutoring Program: 1.7 mos. growth/ 1 mo. instruction

Fig. 4

EVALUATION OF OBJECTIVES MASTERED BY HIGH SCHOOL TUTORS

Objectives:	# of H.S. Tutors meeting objectives	# of H.S. Tutors not meeting objs.
90% of High School students selected for the Ayers St. project will:		
Demonstrate competencies in direct instruction and learning theory techniques as measured by their tutee's accelerated rate of learning, and by participation in workshop discussions.	9	0
Demonstrate competencies in data taking as evidenced by complete and accurate daily and monthly data sheets. (see fig.)	9	0
Express satisfaction with serving to others as measured by positive responses on tutor attitude scale and verbal and written evaluation comments. (see fig.)	9	0
Accept responsibility for helping children as measured by:		
signing contract (fig.) regular (100%) attendance at tutoring sessions (except for previously excused absences).	9	0

Fig. 5

TUTOR ATTITUDE SCALE

We are interested in your feelings about the following statements concerning the Ayers Street Tutoring Program. Please respond to each item. Circle the number that most appropriately describes your response to each statement.

		Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
1.	The experience reinforced my feelings that I would enjoy teaching.	1	2	3	4	5
2.	The experience taught me that I can teach.	1	2	3	4	5
3.	The child's mastery of objectives showed me that I can teach.	1	2	3	4	5
4.	The experience taught me that I can work successfully with people.	1	2	3	4	5
5.	The experience showed me that I enjoy helping others.	1	2	3	4	5
6.	The experience indicated that I can build a good relationship with a child.	1	2	3	4	5
7.	The experience indicated that children relate well to me.	1	2	3	4	5
8.	The child that I tutored acted enthusiastic about working with me.	1	2	3	4	5
9.	I feel that the teachers and consulting teachers were supportive of my efforts.	1	2	3	4	5
10.	I am inspired by this experience to make full use of my capabilities.	1	2	3	4	5
11.	I feel that the time that I had to put into this learning experience was valuable.	1	2	3	4	5

Fig. 5 (cont.)

		Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
12.	I fulfilled my contract by tutoring regaularly and attending required instructional sessions with consulting teachers and teachers.	1	2	3	4	5
13.	If given the chance I would do this again.	1	2	3	4	5
14.	I would recommend this experience to others.	1	2	3	4	5

Please comment on the program. What did you like, what didn't you like. How could we improve it for another year?

Fig. 6

A COMPARISON OF PROGRAM COSTS

1977-1978

Program	Trainer	Person-Days Spent Monitoring & Training	Average Daily Salary	Cost of Monitoring & Training	Cost of Paraprofessional Tutors	Total Program Cost	No. of Children Served	Average Cost/Child
Paraprofessional Tutoring	Consulting Teacher	18	$87	$1,566	$14,704	$16,270	64	$ 254
Ayers St. Cross-Age Tutoring	Consulting Teacher	20	$87	$1,740	--			
	Teachers	4	$82	$ 328		$ 2,068	9	$ 230

1978-1979

Paraprofessional Tutoring	(Same as 1977-1978)							
Ayers St. Cross-Age Tutoring	Consulting Teacher	2	$87	$ 174	--			
	Teachers	4	$82	$ 328				
	Paraprofessional	1	$24	$ 24		$ 426	6	$ 71

-22-

Suggested for further reducing cost in 1979-80 school year:

1. Increase number of children served by Cross-Age Tutors
   (a) More tutors available due to course scheduling
   (b) Tutors will work with groups of 1-4 children
2. Reduce number of person-days spent in training
   (a) Juniors as tutors
   (b) Teachers as trainers

Fig. 7

DIRECT COST OF *AVERAGE TEACHER

Classification	Description	Budgeted Amount
Instruction	Salaries: (Average) Teacher	$13,000
	FICA	791
	Insurance	960
	TOTAL	$14,751

*Ayers Street School

Fig. 8

DIRECT COST OF AVERAGE CONSULTING TEACHER

Classification	Description		Budgeted Amount
Instruction	Salaries:		
		Consulting Teacher	$13,900
	Travel		150
	FICA		841
	Insurance		960
		TOTAL	$15,701

Fig. 9

DIRECT COSTS OF PARAPROFESSIONAL MATH TUTORS

Classification	Description	Quantity	Unit Cost	Budgeted Amount
Instruction	Salaries:			
	Math Tutor	1080 Hrs.	$3.34/hr	$ 3,608
	Math Tutor	1080 Hrs.	$3.34/hr	3,608
	Math Tutor	1080 Hrs.	$3.00/hr	3,240
	Math Tutor	1080 Hrs.	$3.00/hr	3,240
	Travel			180
	FICA			834
				$14,704

APPENDIX I

PEER/CROSS-AGE TUTOR TRAINING PACKET

A special place for special people

Suzanne Bryant Armstrong
Barre City Schools
Mathewson Learning Center
Elm Street
Barre, Vermont 05641
(802-479-9164)

Appendix I

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September 7, 1977

Dear Tutor:

This letter is to inform you about the tutoring program at Ayers St. School during the coming year. It will be under the co-direction of Helen Donahue, Principal of Ayers St., and Sheila Cort, Consulting Teacher in Special Education.

As directors of this program, we view this opportunity to tutor as having a twofold purpose. Primarily, we want to make available that help which may be needed for the children at Ayers St. to maintain steady growth in the areas of Math and Reading. Secondarily, we want to provide young adults an opportunity for a learning experience in working with young children which may help in determining a future career.

To insure success in such a program certain requirements are necessary in order to accomplish these goals and evaluate their effectiveness. The following will be required of each participant:

1. Commitment to tutor a specific child for the duration of the child's needs.
2. Orientation session: one meeting in September.
3. Three observations at Ayers St. at your convenience in September.
4. Initial aptitude measurement.
5. Half hour weekly conference to evaluate teaching/learning procedures once the tutoring session has begun.

If you are interested in participating in this program, please fill out the application form and return it to Mrs. Haad in the guidance department by the fifteenth of September.

Thank you.

Helen Donahue

Helen Donahue

Sheila Cort

Sheila Cort

TUTOR APPLICATION

NAME _____ GRADE _____

ADDRESS _____ HOMEROOM _____

PHONE NUMBER _____ ADVISOR _____

I. Write a statement explaining why you want to tutor.

_____

_____

_____

_____

II. Area of Interest. Please check one.

MATH _____ READING _____

III. Grade level of child. Please check one.

1 _____ 2 _____ 3 _____ 4 _____

IV. Amount of time you can give to this program. Please check appropriate days as well as a specific time.

MON. _____ TUES. _____ WED. _____ THURS. _____ FRI. ___

TIME: _____ _____ _____ _____ _____

V. Please include a copy of your schedule. Thank you.

Signature _____

CHECKLIST FOR CANDIDATES INTERVIEWING FOR AIDE POSITION

Name _____ Date _____

Check the appropriate box

	YES	NO
A. TRAINING POTENTIAL		
(1) initiative		
(2) willingness to learn		
(3) enjoys contact with children		
(4) willingness to work with teachers in classroom		
B. SOCIAL SKILLS		
(1) demonstrates pleasant outgoing personality (smiles, friendly, etc.)		
(2) good listening skills		
(3) ability to get on child's level		
(4) responsibility to be there on time		

TUTOR CONTRACT

I, _____, agree to participate in the tutoring program at Ayers St. School for the duration of the school year _____. The child I will be tutoring three times a week is _____. It is my understanding that service is needed for this individual through direct instruction which I will be providing. To insure optimal service I will attend a weekly conference to evaluate the teaching/learning procedures with the supervisors of this program.

Date _____

Signature _____

NAME _____ DATE _____

CLASSROOM MANAGEMENT OBSERVATION

Teacher _____ Grade _____

Comment on the following observations.

I. Teacher/Student Relationship:

II. Motivation:

III. Materials:

IV. Student's Response:

V. Attention Span:

VI. General Observation:

VII. Questions:

TUTOR SIGN-IN SHEET

Name	Date	Time

ESSENTIAL STRUCTURING REQUIREMENTS

1. Pre-established instructional objectives and corresponding mastery tests

2. Pre-test - leading to instructional prescriptions.

3. Specified sequence of objectives and management procedure to assure sequence is followed

4. Instructional materials designed to teach the objectives and provide sufficient repetition for low performers

5. Criterion tests to check mastery regularly

6. Built-in procedure for modifying instruction when learner doesn't master the instructional prescription

Objectives

I. Objectives must be behavioral. They must be so specific that a stranger to the classroom could easily determine whether child had or had not accomplished that objective.

We limit our objectives to behaviors or descriptions of what the learner will do at the end of the instructional period.

II. An instructional objective should always be written to include the following three components (Mager 1962):

1. Conditions - under which behavior is observed

2. Behavior - a description of the expected final behavior

3. Criteria - what is acceptable performance

Conditions	Behavior	Criteria

Conditions	Behavior	Criteria

Conditions	Behavior	Criteria

Definition of Terms

Minimum Objectives

Continuum

Continuum Test Record Sheet

Probes

Mastery Level Tests

Record Sheets

- class
- individual

Prescription Sheet

Monthly Progress Form

Implementing Minimum Objective Prescription

I. Choose objectives to be taught from the prescription sheet.

II. Teach objectives -

(a) learn effective teaching/learning procedures

(b) find appropriate materials

III. Test monthly -

Choose at least 10 mastery level tests. These should include:

(a) some objectives being currently taught

(b) some objectives recently taught

(c) some objectives that you intend to teach within the following month.

TO: Ayers Street Tutors

FROM: Suzanne Armstrong & Sheila Cort

After you have read How to Be A Good Teacher, please be ready to talk with us about the following:

1. People are taught to behave the way they do.

2. Consequences

3. "Shaping"

4. "Stranger Test" (This relates to objectives)

5. What can happen if a teacher does not describe objectives clearly and in detail?

EFFECTIVE TEACHING/LEARNING PROCEDURES

Teaching/learning involves three processes:

I. MAKING SURE YOU HAVE CHILD'S ATTENTION

Don't teach until child is looking at you and/or the materials you are working with.

II. MAKING CLEAR PRESENTATION OF STIMULUS

III. REACTING TO CHILD'S RESPONSE

(a) When child makes a correct response, the teacher praises or otherwise rewards response.

(b) When child makes an incorrect response, <u>correction is simply more teaching</u>

1. correction shouldn't ever be punishing
2. neither is it a "guessing game"
3. teacher should <u>model</u> correct response

Tutor _____

Observer _____

Date _____

TUTOR OBSERVATION CHECKLIST

ESSENTIAL TUTORING SKILLS

Did the tutor: Comments

1. Establish rapport with the tutee
2. Secure the tutee's attention
3. Give clear instructions, letting the tutee know precisely how (s)he is to respond
4. Give a clean prescription of the new information
5. Praise the tutee for a correct response
6. Correct the tutee by:
   - Modelling the correct answer
   - Saying the answer with the tutee
   - Requiring the tutee to say the answer alone
7. Avoid punishing
8. Avoid using subtle cues to prompt the tutee
9. Stay on task and pace the lesson at a reasonable speed
10. Use specific criteria to judge when an objective has been mastered
11. Use a consistent system of reinforcement
12. Keep accurate records

DAILY TAB SHEET

Tutor _____

Student _____ Grade _____

Teacher _____ School _____

Date	Length of Session	Number of Children in Group	Objective(s) Worked On	Teaching/ Learning Procedure	Comments

MONTHLY REPORT FORM

Tutor: _____ Month _____ 19___

School: _____

Students	AGL	FGL Sept.	FGL for ___	Number of Sessions	Number of Objectives Mastered This Month	Comments

Fig. 5

TUTOR ATTITUDE SCALE

We are interested in your feelings about the following statements concerning the Ayers Street Tutoring Program. Please respond to each item. Circle the number that most appropriately describes your response to each statement.

		Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
1.	The experience reinforced my feelings that I would enjoy teaching.	1	2	3	4	5
2.	The experience taught me that I can teach.	1	2	3	4	5
3.	The child's mastery of objectives showed me that I can teach.	1	2	3	4	5
4.	The experience taught me that I can work successfully with people.	1	2	3	4	5
5.	The experience showed me that I enjoy helping others.	1	2	3	4	5
6.	The experience indicated that I can build a good relationship with a child.	1	2	3	4	5
7.	The experience indicated that children relate well to me.	1	2	3	4	5
8.	The child that I tutored acted enthusiastic about working with me.	1	2	3	4	5
9.	I feel that the teachers and consulting teachers were supportive of my efforts.	1	2	3	4	5
10.	I am inspired by this experience to make full use of my capabilities.	1	2	3	4	5
11.	I feel that the time that I had to put into this learning experience was valuable.	1	2	3	4	5

Fig. 5 (cont.)

		Strongly Agree	Agree	Slightly Agree	Disagree	Strongly Disagree
12.	I fulfilled my contract by tutoring regaularly and attending required instructional sessions with consulting teachers and teachers.	1	2	3	4	5
13.	If given the chance I would do this again.	1	2	3	4	5
14.	I would recommend this experience to others.	1	2	3	4	5

Please comment on the program. What did you like, what didn't you like. How could we improve it for another year?

APPENDIX 2

BARRE CITY MINIMUM OBJECTIVE MATH SYSTEM

The purpose of specifying objectives is to enable teachers to reliably measure the outcomes of instruction; i.e., what the child will be able to do after instruction. While there are many valuable changes that teachers produce in children which cannot be measured by these objectives, student mastery of basic skills objectives is an important component of each child's total development.

Barre City teachers in the six elementary schools realized the importance of having a math curriculum and monitoring system which was district wide and with which teachers could reliably measure and monitor student math progress.

During the 1974-75 school year, the Consulting Teachers, Director of Curriculum, teachers and principals in all schools met for a series of grade level and cross-grade level meetings. These meetings resulted in a skills continuum for grades K-5, which included 206 skills which were basic to mastery of school curriculum.

In addition, during the summer of 1975, the Consulting Teachers conducted a 3-week workshop where the skills continuum was further developed into a minimum objective system. Nineteen teachers and principals representing all six schools participated. Each participant assisted others at their grade level in the development of the following:

1. Minimum objectives for school year
2. Materials to measure
   - (a) student entry level)
   - (b) progress) - Probes and Mastery Tests
   - (c) retention)
3. Data Keeping Management System
4. Reference List of Materials for each objective

The minimum objective system was extended in grades 6-8 during the 1976-77 school year. There are now a total of 283 objectives for grades K-8.

These objectives serve as a basis for the math curriculum for all students. When a child is not mastering the objectives at a rate which will enable him/her to complete all the skills, the classroom teacher refers the child to the Consulting Teacher for further evaluation and program planning.

Samples taken from Barre City
Minimum Objective Math System

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Math Continuum Skills Sheet	5
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Daily Tab Sheet	8
Monthly Report Form	9

Suzanne Bryant Armstong
Mathewson Learning Center
Barre City Schools
Elm Street
Barre, Vermont 05641

DIRECTIONS FOR IMPLEMENTING THE MATH MINIMUM OBJECTIVES SYSTEM

1. During the first two weeks of school, all students should be tested, using a probe one grade level below actual class placement. (example - a fourth grader should be given a third grade probe.) For students who have mastered a majority of the objectives of one grade level below, a probe at the child's actual grade level should be given.

2. Record results on individual and/or student record sheet(s).

3. If a student has not mastered the majority of the objectives at the grade level below his/her actual grade level, continue testing downward and/or refer to the Learning Center for assistance in assessing and program planning.

4. All children should be given probes a minimum of four times per year. A suggested time for probing is before conferences or report cards. Results of probes should be recorded on individual and/or class record sheets. At the end of the school year, information should be transferred to the individual cumulative record in the child's permanent file.

MINIMUM OBJECTIVES FOR MATH

LEVEL ONE

MODULE A: BASIC NUMBER CONCEPTS

A-24 Given instructions to count orally from 0 - 50, the child will count, with 95 - 100% accuracy.

A-25 Given written numbers from 0 - 50, the child will say the number, with 95 - 100% accuracy.

A-26 Given instructions to write (5) dictated numbers from 0-50, the child will write the number, with 95 - 100% accuracy.

A-27 Given the symbols =, +, -, >, <, and instructions to use them with any number facts 0 - 10, the child will write and name each symbol, with 95 - 100% accuracy.
(Addison Wesley p. 56, 138, Teacher's Ed. p. 155, 268; Holt p.

A-28 Given rows of numbers 0 - 10 and instructions to circle all numbers either: a) greater than, b) less than, c) equal to the first number, the child will circle the correct number, with 90 - 100% accuracy.
(Addison Wesley p. 53, 54; Holt p. 89-92)

A-29 Given directions, the child will write the numbers 0 - 10 in sequence, with 100% accuracy.
(Addison Wesley p. 49-50; Holt p. 28, 71, 97)

A-30 Given directions, the child will write the numbers from 0 - 100 by 10's in sequence, with 90 - 100% accuracy.
(Addison Wesley p. 155, 167; Holt p. 83, 84)

A-31 Given a number from 0 - 10 and (10) blank squares, the child will color the number of squares indicated, with 100% accuracy.
(Addison Wesley p. 32, 38; Holt

A-32 Given a set of up to 10 objects, the child will write the number of objects in the set, with 95 - 100% accuracy.
(Addison Wesley p. 16 - 28; Holt p. 17, 19, 23, 25)

A-33 Given 1 or 2 digit numbers, the child will write the number of tens and ones, with 95 - 100% accuracy.
(Addison Wesley p. 157-166; Holt p. 85, 87)

A-34 Given a numeral from 0 - 50, the child will write the numeral before or after the given number, with 95 - 100% accuracy.
(Addison Wesley p. 172, 176; Holt p. 169-170)

MATH SKILLS CONTINUUM

A: BASIC NUMBER CONCEPTS

The student will:

K	A-1	Count to ten orally
	A-2	Point to larger or smaller
	A-3	Point to shorter or longer
	A-4	Point to shorter or taller
	A-5	Point to lower or higher
	A-6	Point to fat or thin
	A-7	Mark the set that has more/less
	A-8	Count ordered set 0-10 objects orally
	A-9	Count unordered set 0-10 objects orally
	A-10	Name number when pointed to (0-10)
	A-11	Write dictated numbers 0-5
	A-12	Write dictated numbers 6-10
	A-13	Tell number that comes after (0-10)
	A-14	Tell number that comes before (0-10)
	A-15	Take given number of objects from set (0-10)
	A-16	Mark the sets that are equal
	A-17	Mark the set that has a smaller number
	A-18	Mark the set that has larger number
	A-19	Match the set of objects with the number (0-10)
	A-20	Say zero or nothing when shown "0" on flashcard
	A-21	Say zero or nothing when shown [illegible] on flashcard
	A-22	Identify square, triangle, rectangle & circle
	A-23	Point or mark 1st, 2nd, 3rd or last in row of 10 objects
1	A-24	Count from 0-50 orally
	A-25	Read numbers 0-50 orally
	A-26	Write dictated numbers 0-50
	A-27	Uses =, +, >, < with number facts 0-10
	A-28	Circle numbers either equal, greater or less than given number (0-10)
	A-29	Write numbers in sequence 0-10
	A-30	Write numbers by 10's to 100
	A-31	Color in squares for given number (0-10)
	A-32	Write the number of objects in set (0-10)
	A-33	Write number of 1's and 10's in 1 or 2 digit numbers
	A-34	Write number before and after (0-50)
2	*A-35 BC #1	Recite numerals in sequence (1-100)
	*A-36 BC #2	Write dictated numbers (1-100)
	A-37	Read numbers orally (0-999)
	A-38	Write the 1's, 10's & 100's digit of 1, 2 or 3 digit numbers
	A-39	Circle odd numbers (0-50)
	A-40	Complete skip counting patterns (2's, 5's or 100's)
	A-41	Read Roman numerals 1-12
	A-42	Uses >, < , = with 3-digit numbers
3	A-43	Write numbers from written word names (1-100)
	A-44	Read numbers 1,000-9,999
	A-45	Write numbers in sequence from random order (100-999)
	A-46	Complete skip number patterns (2's & 5's to 100)
	A-47a	Write place value of underlined digit (0-9,999)
	b	Write digit for given place value (0-9,999)

	A-48	Write missing number or symbol (>, <, =) using numbers 0-100	
	A-49	Write Roman numerals from Arabic numbers (1-39)	
	*A-50 BC #3	Write word names for 0-100	
	A-51a	Round off to nearest 10 (0-50)	
	b	Round off to nearest 100 (50-999)	
4	A-52	Write the number from the given place value space	
	A-53	Read 4-7 digit numbers orally	
	A-54	Write 3-7 digit numbers from written words	
	A-55	Write 5-9 digit dictated numbers	
	A-56	Round off 4-6 digit numbers to the nearest 1000	
	A-57	Change Roman numerals to Arabic numerals & Arabic numerals to Roman numerals (40-399)	
5	A-58	Write the place value for every digit (4-7 digits)	
	A-59	Write numbers from written words (4-7 digits)	
	A-60	Write dictated numbers (4-7 digits)	
	A-61	Write equivalent Roman numerals from Arabic numerals (400-3,999)	
	A-62	Write equivalent Arabic numerals from Roman numerals (400-3,999)	
	A-63	Round off numbers (1 million to 999 billion)	
	*A-64 BC #14	Identify symbols +, -, x and ÷ by giving examples	
6	A-65	Write numbers through hundred billions in expanded notation	
	A-66	Write equivalents of single digit numbers to any place	
	A-67	Round off & write each number to any place value indicated through millions	
	A-68	Estimate whole number processes using the 4 basic operations	
7	A-69	Write numbers (with any number of digits) in scientific notation	
	A-70	Find a fraction or percent of a number (orally estimated	
8	A-71	Write numbers in scientific notation from billionths to billions	
	A-72	Draw a number line and place 10 integers	
	A-73	Explain absolute value orally	
	A-74	Explain on paper the commutative, associative, distributive, inverse & identity properties	
	A-75	Solve equations in one variable using above properties	
MODULE B: ADDITION			
1	B-1	Add one to a one digit number	
	B-2	Add two one-digit numbers with sums 10 or below	
	B-3	Timed Test	
2	B-4	Add 3 one-digit numbers with sums no greater than 18	
	B-5	Add 2 two-digit numbers with no regrouping	
	B-6	Add 2 two-digit numbers with regrouping	
	B-7	Add 2 three-digit numbers with no regrouping	
	B-8	Timed Test	
3	B-9	Add 2 three digit numbers with regrouping in ten's only	
	B-10	Add 2 three digit numbers with regrouping in hundred's only	

MATH CONTINUUM SKILLS SHEET

NAME _____

GRADE _____

TEACHER _____

SCHOOL _____

Entry Level _____ Date _____

Exit Level _____ Date _____

Probe #1 _____ Date _____

Probe #2 _____ Date _____

Probe #3 _____ Date _____

Probe #4 _____ Date _____

Probe #5 _____ Date _____

Probe #6 _____ Date _____

Probe #7 _____ Date _____

BASIC NUMBER CONCEPTS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
19 20 21 22 23 | 1 24 25 26 27 28 29 30 31 32 33 34 | 2 35
36 37 38 39 40 41 42 | 3 43 44 45 46 47 48 49 50 51 | 4 52
53 54 55 56 57 | 5 58 59 60 61 62 63 64 | 6 65 66 67 68 | 7 69
70 | 8 71 72 73 74 75

ADDITION

1 2 3 | 2 4 5 6 7 8 | 3 9 10 11 12 13 14 | 4 15 16 17

SUBTRACTION

1 2 3 | 2 4 5 6 7 8 | 3 9 10 11 12 13 14 | 4 15 16 17
18 17

MULTIPLICATION

1 2 3 4 5 | 4 6 7 8 9 10 11

DIVISION

1 2 3 | 4 4 5 6 7 8 9 | 5 10 11 12 13 | 6 14 15 16 17

FRACTIONS

1 2 3 | 3 4 | 4 5 6 7 8 | 5 9 10 11 12 13 14 15 16
17 | 18 19 20 21 22 23 24 25

DECIMALS

1 2 3 4 | 6 5 6 7 8 9 10 11 12 | 7 13 14 15

NAME _____

H: WORD PROBLEMS

1 (1) | 2 (2) | 3 (3) (4) | 4 (5) | 5 (6) (7) (8) | 6 (9) (10) | 7 (11) (12) (13) (14) (15) (16)

TIME

(2) (3) (4) | 1 (5) (6) | 2 (7) (8) (9) | 3 (10) (11) (12) (13) | 4 (14)

HONEY

(2) | 1 (3) (4) | 2 (5) (6) (7) | 3 (8) (9) (10) (11) | 4 (12) | 5 (13)

MEASUREMENT

| 1 (2) (3) (4) (5) (6) (7) | 2 (8) (9) (10) (11) (12) (13) | 3 (14) (15) (16) (17)
(19) (20) | 4 (21) (22) | 5 (23) (24) (25) | 6 (26)

PERCENT

(1) (2) (3) (4) (5) (6) | 8 (7)

GEOMETRY

(1) (2) (3) (4) | 7 (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) | 8
(19) (20) (21) (22) (23) (24) (25) (26)

GRAPHING

(1) (2)

Name _____ Mastery Level Test

Date _____ Addition B-3

Write the sums:

2	6	5	8	4
+ 4	+ 3	+ 1	+ 2	+ 3
5	2	9	3	4
+ 3	+ 7	+ 1	+ 2	+ 5

Score _____

B-3 Given (10) addition facts of 2 one-digit numbers whose sums do not exceed 10, the student will write the answers within one minute with 90-100% accuracy.

DAILY TAB SHEET

Tutor _____

Student _____ Grade _____

Teacher _____ School _____

Date	Length of Session	Number of Children in Group	Objective(s) Worked On	Teaching/ Learning Procedure	Comments

MONTHLY REPORT FORM

Tutor: _____ Month _____ 19___

School: _____

Students	AGL	FGL Sept.	FGL for ___	Number of Sessions	Number of Objectives Mastered This Month	Comments